CELL-DYN® 1800
Field Service Training
Workbook

Abbott Laboratories
Abbott Park, IL. 60064

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Intended Use of Training Workbook

The CELL-DYN 1800 Field Service Training Workbook is recommended as a self-paced training guide to familiarize currently trained CELL-DYN 1700 Abbott Laboratories Field Service personnel on design enhancements made to the CELL-DYN 1800 instrument. The CELL-DYN 1800 Field Service Training Workbook is not designed to replace any CELL-DYN 1000 Series instrument training program(s).

The prerequisite for taking this course is that the trainee must have completed a CELL-DYN 1000 Series Field Service training class or equivalent at one of the Area Service and Support training centers worldwide. It is the responsibility of the Area Service and Support Organizations to implement, monitor and verify satisfactory completion of this self-paced course. A final test is provided in Section 5 and can be used by Area Service and Support Organizations for certification.

Revision History	**Pages Revised and Added**
96919-101 4/2003	First Release

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Section 2…. User Interface
Section 3…. WBC Differential Changes
Section 4…. Hardware
Section 5…. Appendix

Section 1: Overview

- Learning Objectives
- CELL-DYN 1700 and CELL-DYN 1800 Comparison Chart - Covers
- Front View
- Right Side View
- Rear View
- Left Side View
- Physical Specifications

Learning Objectives

Learning Objectives

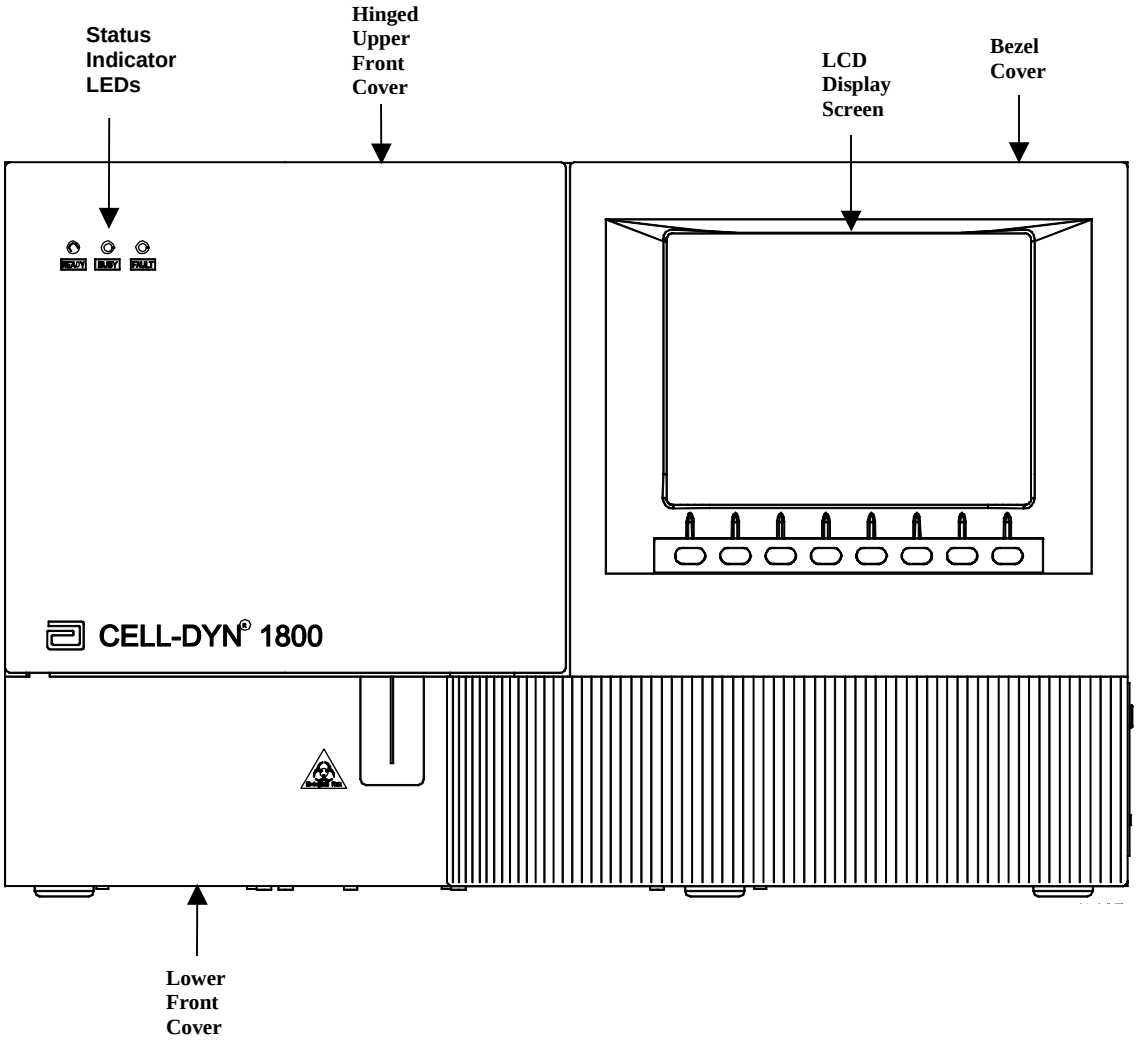
Section 1 will provide an overview of the System's covers and physical dimensions of the CELL-DYN 1800. After reviewing Section 1 of this workbook you should be able to do the following:

- List the differences between the CELL-DYN 1700 and CELL-DYN 1800 covers.
- Identify the display screen that is used on the CELL-DYN 1800.
- Identify the connections located on the right side of the CELL-DYN 1800.

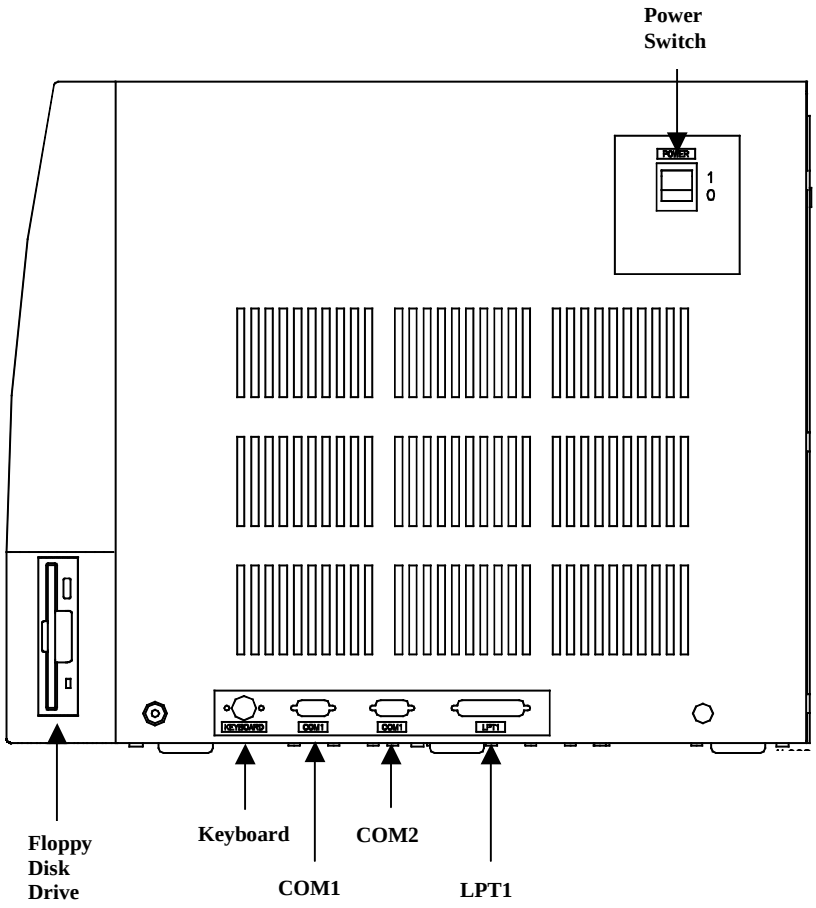
CELL-DYN 1700 and CELL-DYN 1800 Comparison Chart - Covers

Name	**CELL-DYN 1700/1700CS**	**CELL-DYN 1800**
Covers		
Upper Front	Yes	Different, hinged cover that opens to the left and contains Status Indicator PCB.
Lower Front	Yes	Different, secured to bezel.
Bezel	Yes	Different, contains LCD display screen, Touch Pad (membrane) keyboard and floppy disk drive.
Top	Yes	Different dimensions
Left	Yes	Different dimensions
Right	Yes	Different, contains cut out to connect PC/2 keyboard, LIS and printer.

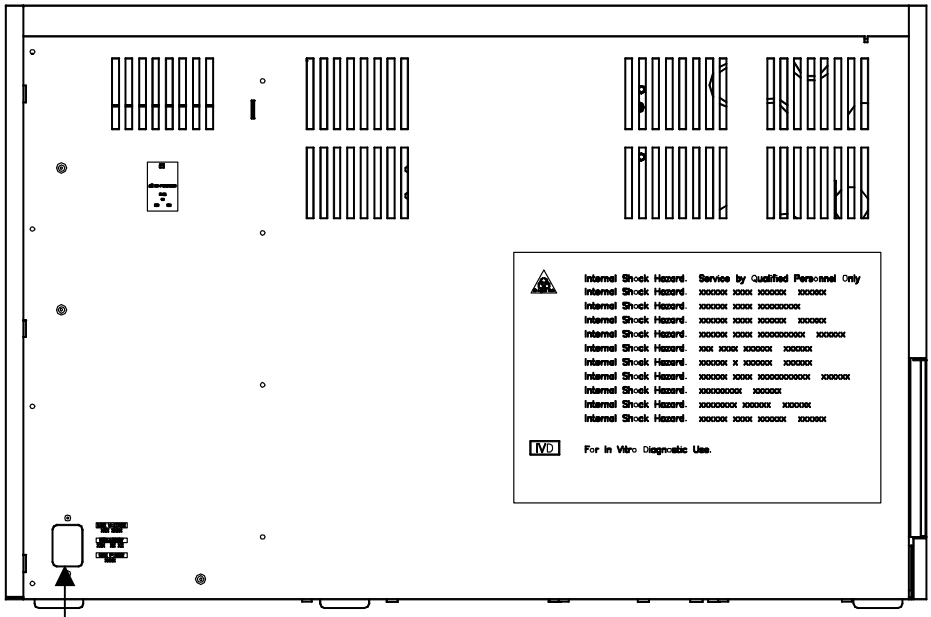
CELL-DYN 1800 - Front View



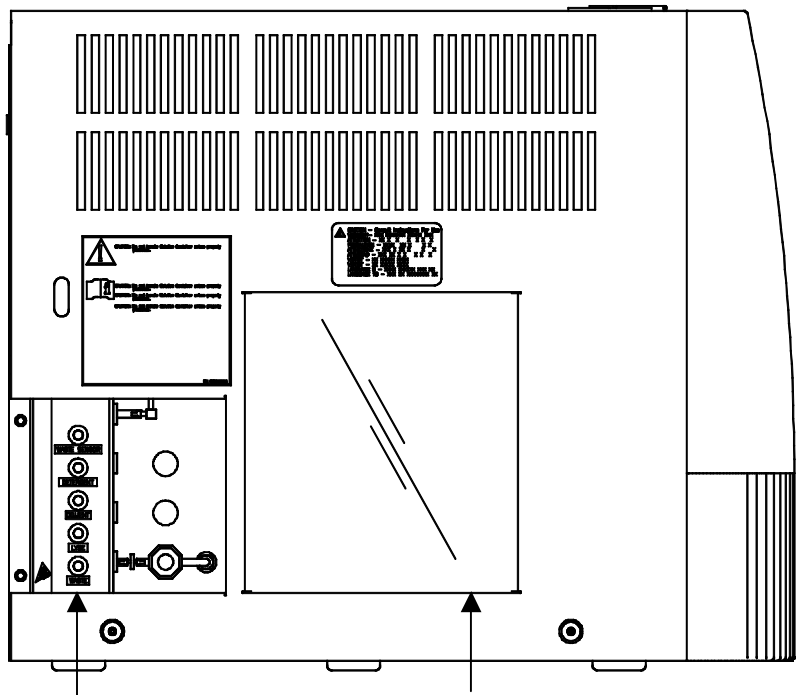
CELL-DYN 1800 – Right Side View



CELL-DYN 1800 – Rear View



CELL-DYN 1800 – Left Side View



Physical Specifications

Physical Dimensions

Dimension	Instrument
Height	17 5/8” (45 cm)
Width	26” (66 cm)
Depth	21” (53 cm)
Weight	122 lbs (55 kg)

Dimensions after Packaging for Shipment

Dimension	Instrument
Height	32” (81 cm)
Width	38 1/2” (98 cm)
Depth	28 1/2” (72 cm)
Weight	230 lbs (104 kg)

Note: *For complete listing of instrument specifications, refer to CELL-DYN 1800 System Operator’s Manual, Section 4 Performance Characteristics and Specifications*

Section 2: User Interface

- Learning Objectives
- CELL-DYN 1700 and CELL-DYN 1800 Comparison Chart – User Interface
- Operator Screens

Learning Objectives

Learning Objectives

Section 2 will explain the user interface changes made to the CELL-DYN 1800. After reviewing Section 2 of this workbook you should be able to do the following:

- List all of the changes made to the User Interface Software.
- Identify the printer formats available on the CELL-DYN 1800.
- Describe where to modify the printer formats.
- Describe the change made to the Specimen ID field in the Run Screen.
- Describe how many run cycles can be stored in the CELL-DYN 1800 Data Log.

CELL-DYN 1700 and CELL-DYN 1800 Comparison Chart – User Interface

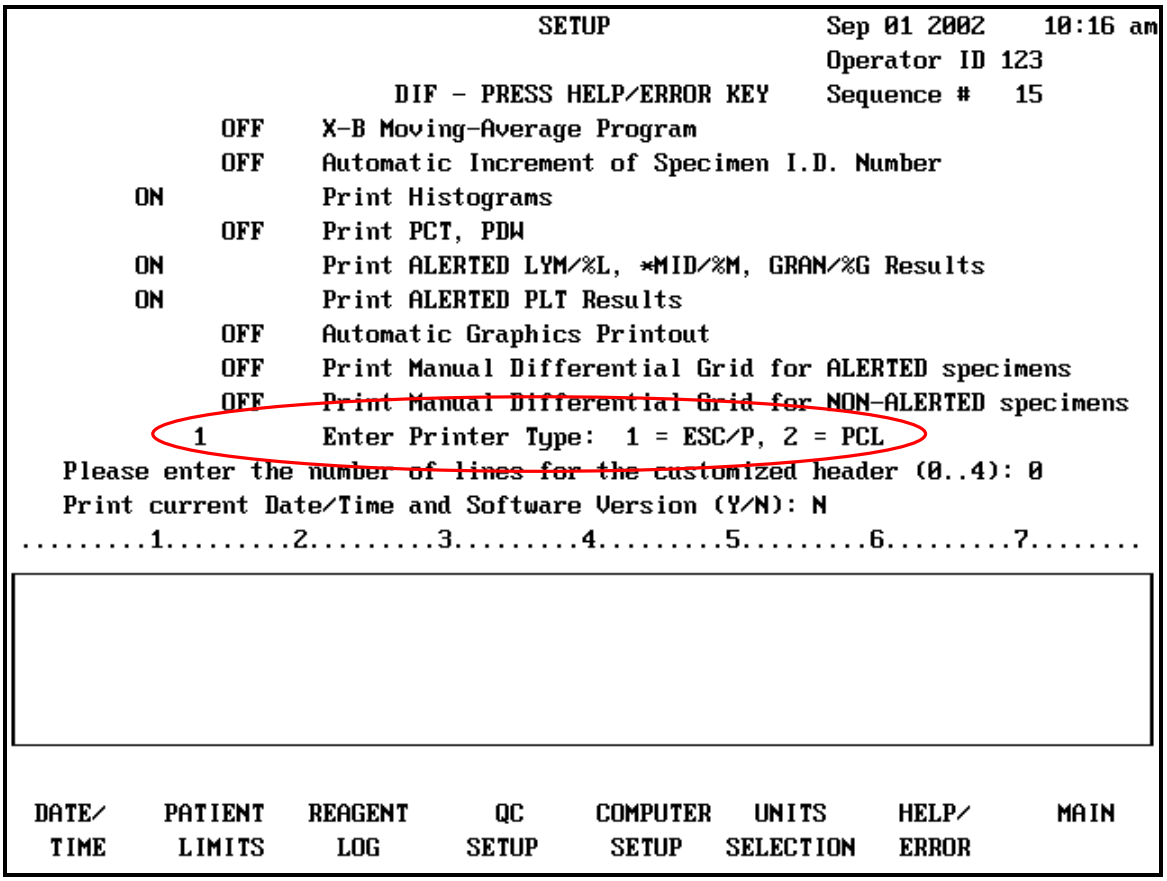
Name	**CELL-DYN 1700/1700CS**	**CELL-DYN 1800**
User Interface		
Quality Control Files	Twelve (12) QC Files (four (4) each for L, N, H controls)	Same
Replicate Files	Nine (9) Replicate Files (120 data points per file)	Same
QC Upload/Download	Yes	Yes
Data Log Storage	5,000 Run Cycles	10,000 Run Cycles
Data Log Storage Type	Numeric & Graphic data	Same
RS232 Interface	Yes	Yes
Computer Interface Configuration	Done in software: **SETUP** menu – **COMPUTER SETUP**	Same
Report Demographics	Specimen ID # - nine (9) numeric digits	Specimen ID # - 16 alphanumeric characters
	Patient Name	Same
	Male/Female	Same
	Date of Birth	Same
	Physician Name	Same
	Date/Time Collected	Same
	Comments	Same
Patient Limit Sets	4 - User Definable	Same
Reference Range Display (Limit Sets)	Yes	Same
Patient Limit Flag (L, H)	Yes - Screen/Printout	Same
Panic Limit Flags (LL, HH)	Yes	Same
WBC Histogram Range	0 to 450 fL	Same
Customized Header	Yes - 4 Lines	Same
Optional Manual Differential Grid	Yes - For Alerted and Non-Alerted Specimens	Same
On-Screen Maintenance Procedures	Yes - Graphic Color Directions	Same

Accessories		
Handheld Barcode Reader	No	Yes (optional)
Printer	Okidata 320 dot matrix printer	Okidata 320 dot matrix printer and ***** HP Inkjet® Printer
Printer formats	ESC/P	ESC/P and PCL3 (selectable in **SETUP** menu)

* model depends on market availability

Operator Screens

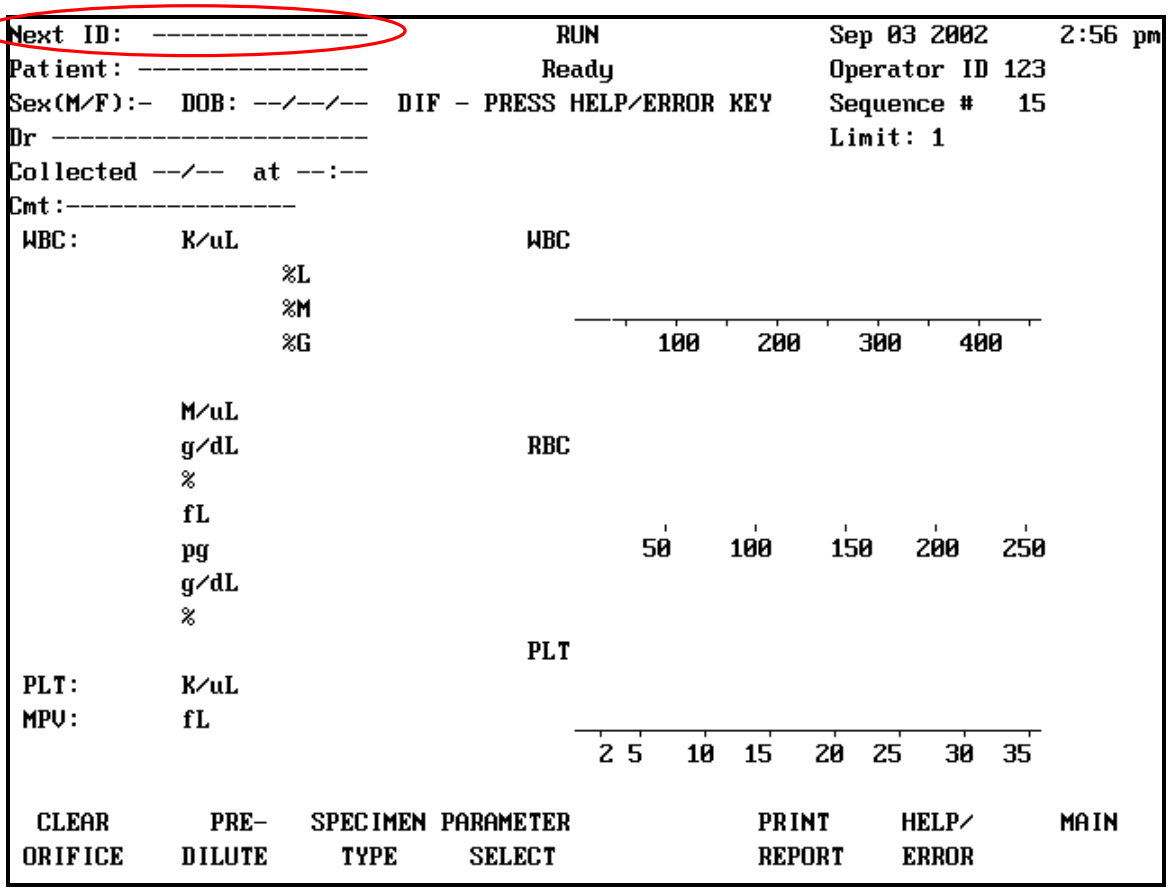
SETUP MENU


SETUP
Sep 01 2002 10:16 am
Operator ID 123
DIF - PRESS HELP/ERROR KEY
Sequence # 15
OFF X-B Moving-Average Program
OFF Automatic Increment of Specimen I.D. Number
ON Print Histograms
OFF Print PCT, PDW
ON Print ALERTED LYM/%L, *MID/%M, GRAN/%G Results
ON Print ALERTED PLT Results
OFF Automatic Graphics Printout
OFF Print Manual Differential Grid for ALERTED specimens
OFF Print Manual Differential Grid for NON-ALERTED specimens
1 Enter Printer Type: 1 = ESC/P, 2 = PCL
Please enter the number of lines for the customized header (0..4): 0
Print current Date/Time and Software Version (Y/N): N
.....1.....2.....3.....4.....5.....6.....7.....
DATE/ TIME
PATIENT LIMITS
REAGENT LOG
QC SETUP
COMPUTER SETUP
UNITS SELECTION
HELP/ ERROR
MAIN

SETUP Menu Differences

- Printer Type: 1 = ESC/P, 2 = PCL

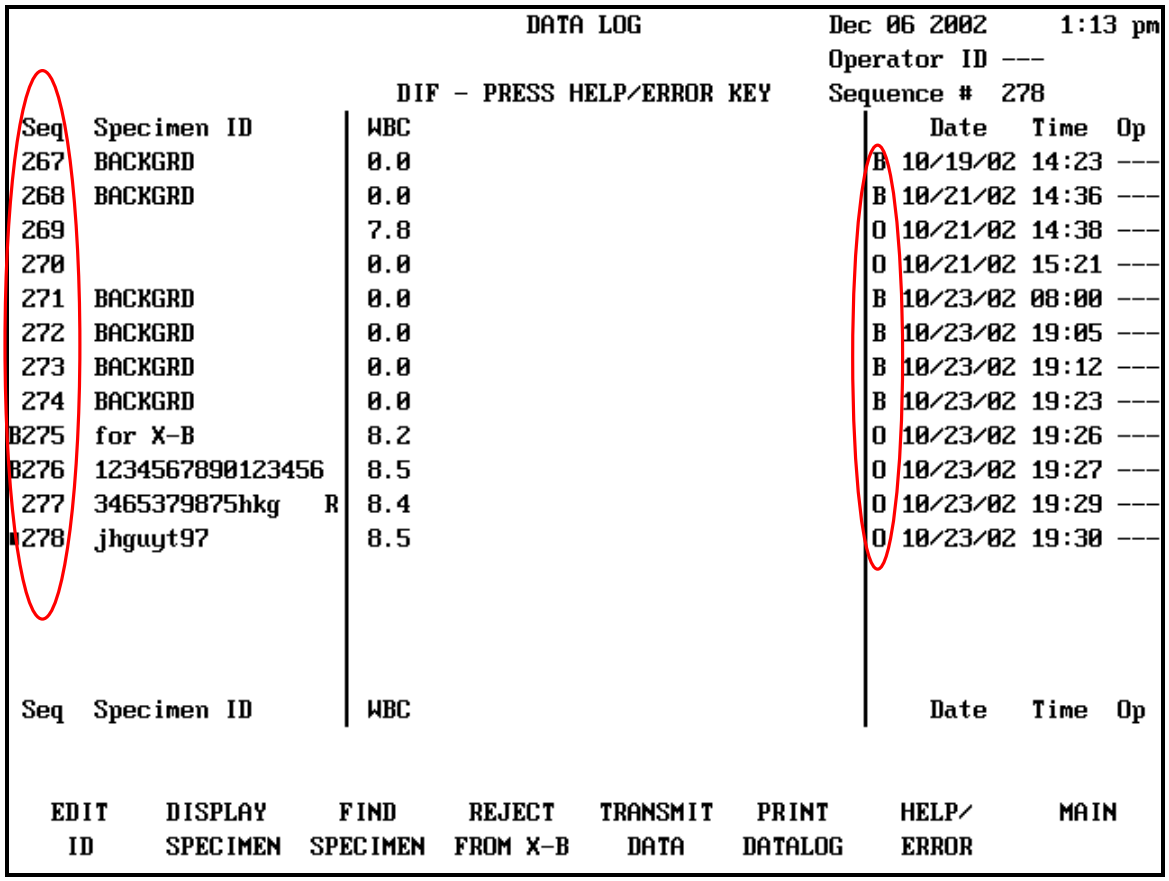
RUN/PRIME MENU



RUN/PRIME Menu Differences

- Up to 16 alphanumeric characters can be entered into the Specimen ID field.

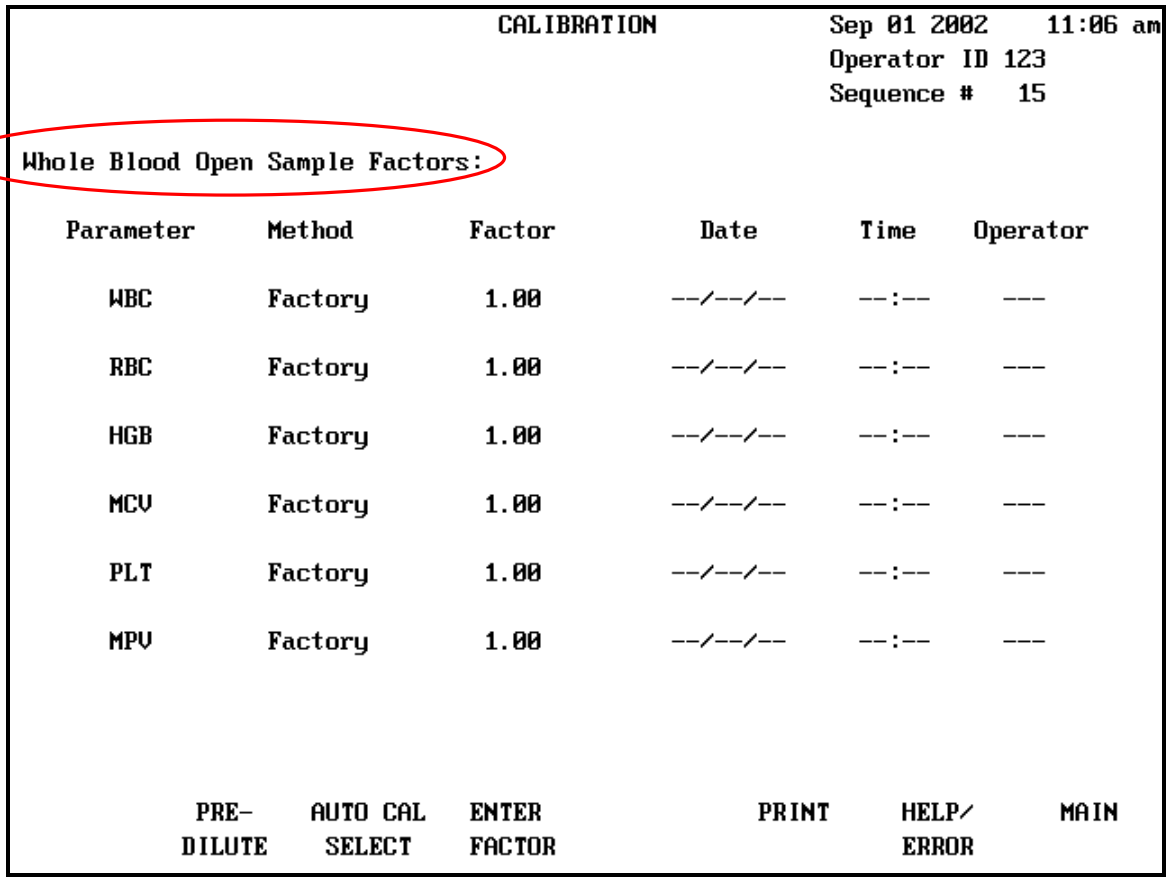
DATA LOG MENU


DATA LOG
Dec 06 2002 1:13 pm
Operator ID ---
DIF - PRESS HELP/ERROR KEY
Sequence # 278
Seq Specimen ID WBC Date Time Op
267 BACKGRD 0.0 B 10/19/02 14:23 ---
268 BACKGRD 0.0 B 10/21/02 14:36 ---
269 7.8 O 10/21/02 14:38 ---
270 0.0 O 10/21/02 15:21 ---
271 BACKGRD 0.0 B 10/23/02 08:00 ---
272 BACKGRD 0.0 B 10/23/02 19:05 ---
273 BACKGRD 0.0 B 10/23/02 19:12 ---
274 BACKGRD 0.0 B 10/23/02 19:23 ---
B275 for X-B 8.2 O 10/23/02 19:26 ---
B276 12345678901234567 8.5 O 10/23/02 19:27 ---
277 3465379875hkg R 8.4 O 10/23/02 19:29 ---
278 jhguyt97 8.5 O 10/23/02 19:30 ---
Seq Specimen ID WBC Date Time Op
EDIT ID
DISPLAY SPECIMEN
FIND SPECIMEN
REJECT FROM X-B
TRANSMIT DATA
PRINT DATALOG
HELP/ ERROR
MAIN

DATA LOG Menu Differences

- The Data Log stores the last 10,000 run cycles including all patient demographics, numeric data and histograms.
- The mode letter “C” indicating the closed mode has been removed since this mode does not exist in the CELL-DYN 1800.

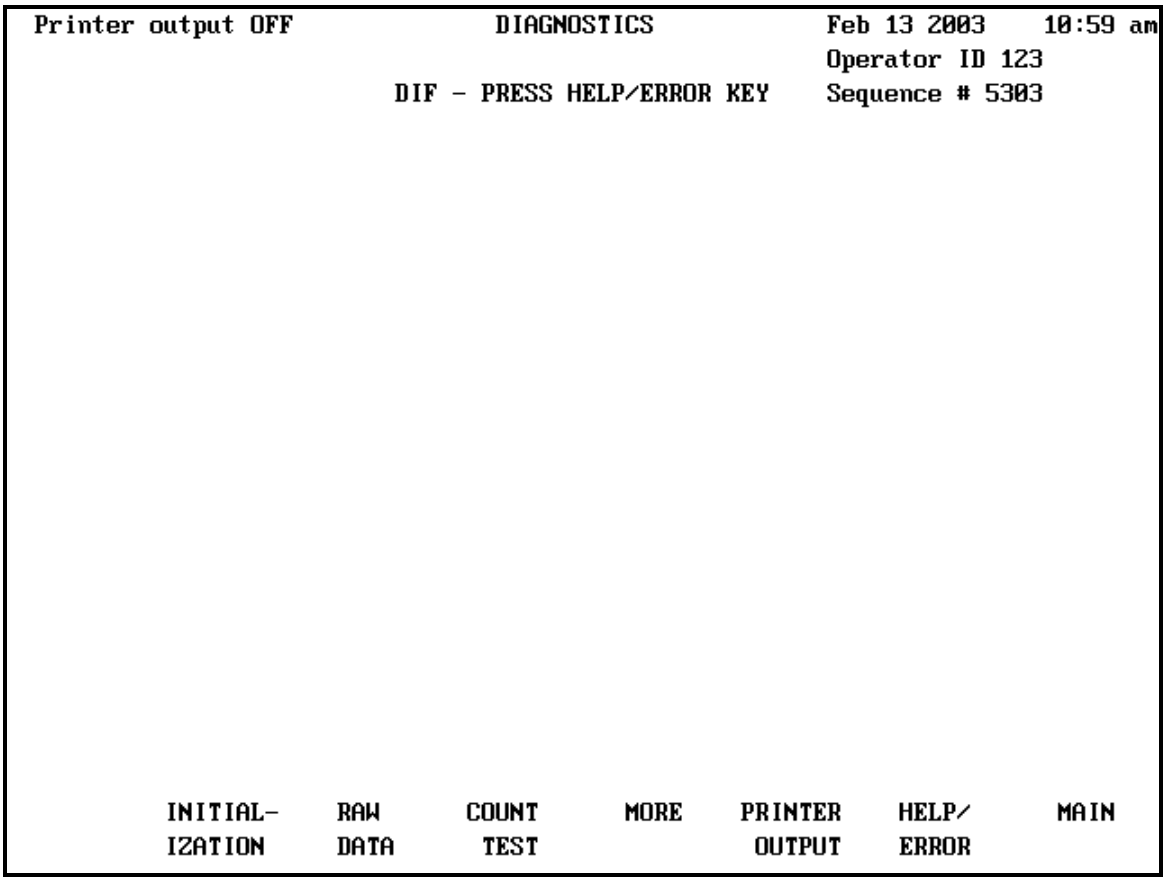
CALIBRATION MENU



CALIBRATION Menu Differences

- All references related to the closed mode have been eliminated since this mode does not exist in the CELL-DYN 1800.

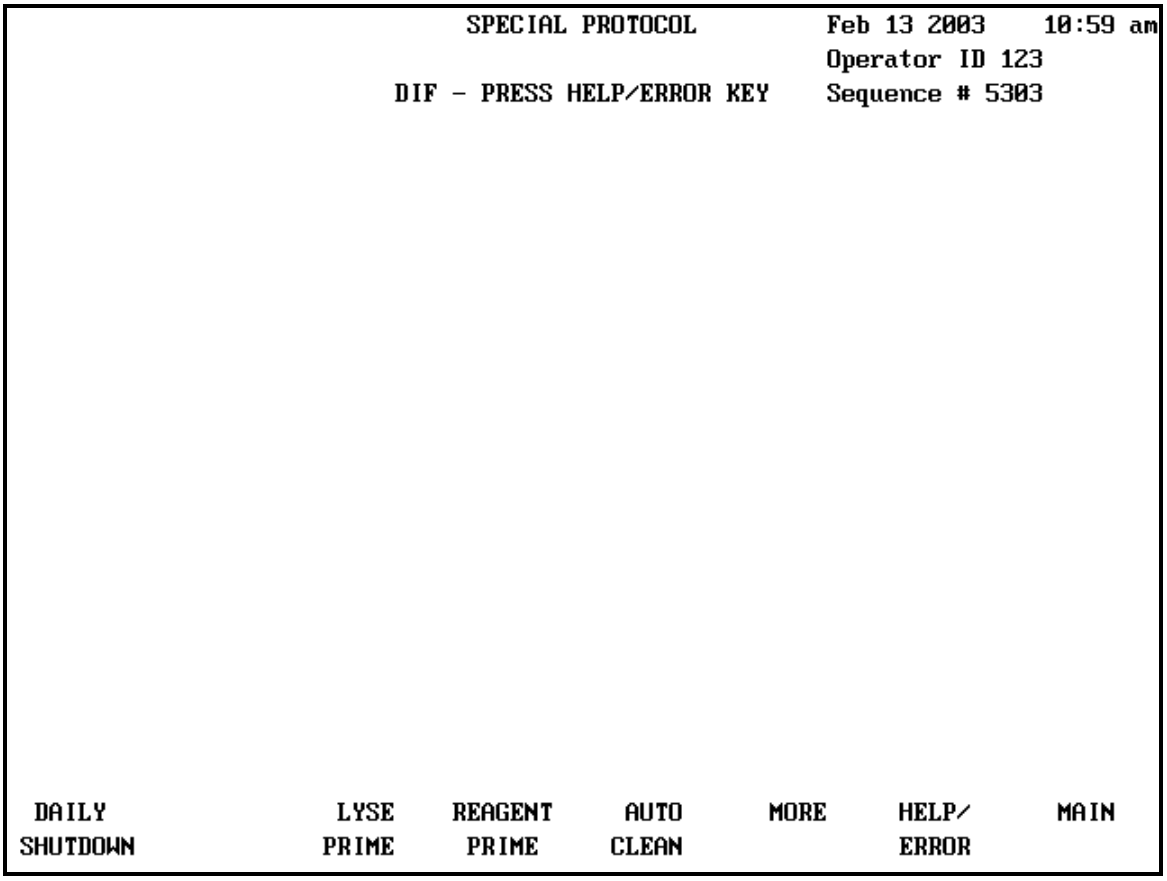
DIAGNOSTICS MENU



DIAGNOSTICS Menu Differences

- All references related to the closed mode have been eliminated since this mode does not exist in the CELL-DYN 1800.

SPECIAL PROTOCOLS MENU



SPECIAL PROTOCOLS Menu Differences

- All references related to the closed mode have been eliminated since this mode does not exist in the CELL-DYN 1800.

Section 3: WBC Differential Changes

- Learning Objectives
- CELL-DYN 1700 and CELL-DYN 1800 Comparison Chart – System Performance
- Overview of Changes to WBC Differential
  - Cyanide-Free Diff Lyse
  - Differential Algorithms
    - Differential Channel/Size Ranges
    - Fixed Groups and Thresholds
    - Region Alerts

Learning Objectives

Learning Objectives

Section 3 will explain changes made to the WBC differential as a result of the use of Cyanide-Free (CN-Free) Diff Lyse on the CELL-DYN 1800. After reviewing Section 3 of this workbook you should be able to do the following:

- Describe the changes made to the CELL-DYN 1800 algorithms to accommodate the CN-Free Diff Lyse.
- Describe changes made to the region alerts as a result of the CN-Free Diff Lyse.

CELL-DYN 1700 and CELL-DYN 1800 Comparison Chart – System Performance

Name	**CELL-DYN 1700/1700CS**	**CELL-DYN 1800**
System Performance		
Parameters	18 (PCT and PDW not reportable in US)	18 (PCT and PDW not reportable in US)
WBC Differential	3 Part Diff (Lym, Mid, Gran)	Same
Histograms	WBC, RBC, PLT (display & printout)	Same
Technology	WBC, RBC, PLT: Impedance	Same
	HGB: Modified Cyanmethemoglobin Method	Modified Methemoglobin Method (cyanide free)
Closed Tube Sampler	No/Yes	No
Sample Volume		
Open	30 µL	Same
Closed	450 µL	N/A
Pre-Dilute	40 µL	Same
Reagents		
	Lytic Agent (Diff Screen)	Cyanide-Free (CN-Free) Diff Lyse
	Diluent (Diff Screen)	Same
	Detergent (Diff Screen)	Same

Overview of Changes to WBC Differential

Minor changes were made to the CELL-DYN 1800 WBC differential.

- The conversion from lyse, containing Potassium Cyanide to a CN-Free Diff Lyse reagent.
- Changes made to the WBC algorithms and region alerts to accommodate the CN-Free Diff Lyse reagent.

Cyanide-Free Diff Lyse (CN-Free Diff Lyse)

Lytic Agent (CELL-DYN 1700) vs. Cyanide-Free Diff Lyse (CELL-DYN 1800)

- Reduces the hazardous element of the lyse reagent.
- Benefits customers when complying with local environmental regulations.

The CN-Free Diff Lyse converts hemoglobin to a modified hemoglobin complex that is measurable at 540 nanometers (the quaternary ammonium lysate participates to form a chromagen for hemoglobin measurement).

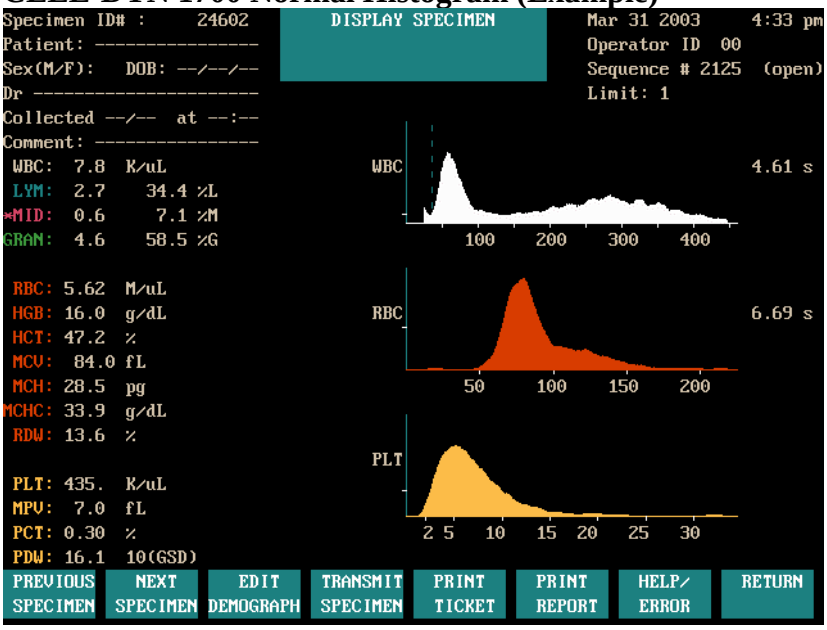
Differential Algorithms

Although the technology and methodology used to produce the WBC count, differential and histogram in the CELL-DYN 1800 is generally the same as in the CELL-DYN 1700, the CELL-DYN 1800 WBC algorithms which include, differential channel/size ranges and region alerts have been revised to enhance the System's performance.

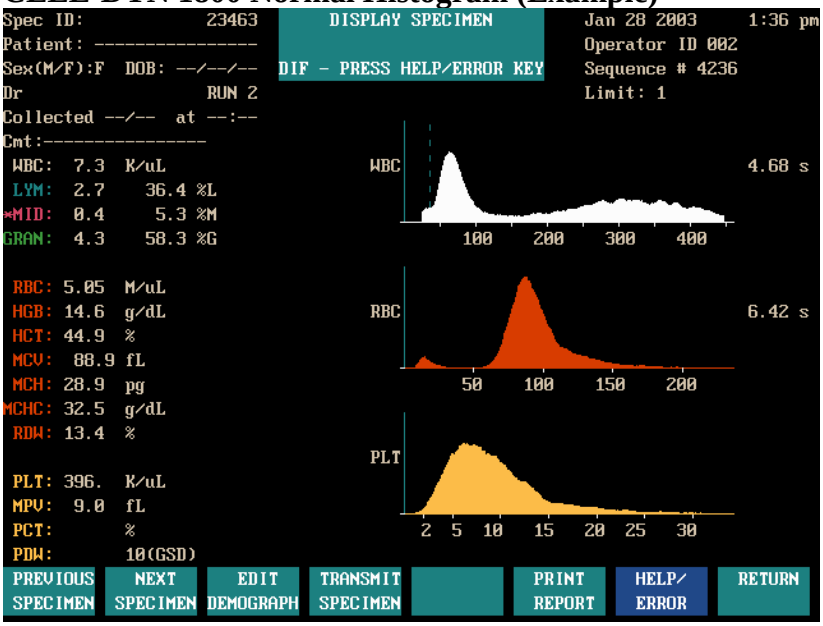
Refer to the histogram(s) on the following page. Both instruments display cell size range to 450 femtoliters. In addition, the CELL-DYN 1700 and CELL-DYN 1800 begin to count cells for the differential in channel 20.

- The CELL-DYN 1700 begins to plot the histogram from channel 16.
- The CELL-DYN 1800 begins to plot the histogram at channel 12.

CELL-DYN 1700 Normal Histogram (Example)



CELL-DYN 1800 Normal Histogram (Example)



WBC Differential Channel/Size Ranges

The WBC differential on both the CELL-DYN 1700 and the CELL-DYN 1800 is determined by counting the number of cells that fall into three (3) general areas of the histogram representing three (3) WBC sub-populations. These three (3) areas are based on the size of cells (as determined by impedance) in their lysate-modified form and correlate to Lymphocytes, Mid-sized Cells and Granulocytes. The WBC differential channel/size range differences between the CELL-DYN 1700 and the CELL-DYN 1800 are detailed in the table below.

Electronic Differential Thresholds – Comparison Chart

		CELL-DYN 1700		CELL-DYN 1800	
Cell	**Group**	**Channels**	**Volume**	**Channels**	**Volume**
	G0	1 – 15	0 – 27 fL	1 – 11	0 – 20 fL
	G1	16 - 19	28 – 34 fL	12 - 19	21 – 34 fL
Lymphs	G2	20 – 25	35 – 44 fL	20 – 30	35 – 53 fL
	G3	26 – 49	45 – 87 fL	31 – 42	54 – 74 fL
	G4	50 - 62	88 – 109 fL	43 - 55	75 – 97 fL
Mid Cells	G5	63 – 83	110 – 146 fL	56 – 69	98 – 121 fL
	G6	84 - 96	147 – 169 fL	70 - 89	122 – 156 fL
Grans	G7	97 – 109	170 – 192 fL	90 – 109	157 – 192 fL
	G8	110 – 228	193 – 401 fL	110 – 228	193 – 401 fL
	G9	229 – 253	402 – 445 fL	229 – 253	402 – 445 fL
	G10	254 – 255	446 – 449 fL	254 – 255	446 – 449 fL
	G11	256	450 fL	256	450 fL

Fixed Groups and Thresholds:

The X-axis of the WBC histogram for both the CELL-DYN 1700 and CELL-DYN 1800 Systems depicts a size range of up to 450 fL divided into 256 channels.

- These 256 channels are broken into 12 groups labeled G0 through G11.
- Each group encompasses a range of cell sizes measured in femtoliters
- Each channel represents 1.76 fL and, therefore, a 5.0-micron diameter polystyrene microsphere will fall into channel 56 on both systems.

Referring to the table above, compare the range of volumes to the range of channels within each group for both instruments. Note that not only does the range of volumes for each group differ between the two systems, but the channels have also changed.

Region Alerts

In addition to the WBC histogram algorithm and differential channel/size range enhancements, the region alerts were reassessed and optimized. The twelve "groups" of channels discussed in the Fixed Groups and Fixed Threshold section of this training workbook are also used to determine the criteria for the region alerts. Region alerts are set by mathematically comparing the number of cells contained in a certain group to the number of cells in one or more other groups as determined by the Region Alert Algorithms.

CELL-DYN 1700 Region Alert Algorithms

R0	Group [1] ≥ 135
LYM R1	Group [2] / LYM ≥ 0.20
LYM R2	Group [4] / LYM ≥ 0.192
MID R2	Group [5] / Group [4] ≥ 1.75
MID R3	Group [7] / Group [6] ≥ 2.20
GRAN R3	Group [7] / GRAN ≥ 0.061
R4	Group [10] / Group [9] ≥ 0.110 or Group [10] / Group [11] / Group [9] ≥ 1.64

CELL-DYN 1800 Region Alert Algorithms

R0	Group [1] ≥ 300
LYM R1	Group [2] / LYM ≥ 0.35
LYM R2	Group [4] / LYM ≥ 0.40
MID R2	Group [5] / Group [4] ≥ 1.3
MID R3	Group [7] / Group [6] ≥ 2.5
GRAN R3	Group [7] / GRAN ≥ 0.18
R4	Group [10] / Group [9] ≥ 0.14 or Group [10] + Group [11] / Group [9] ≥ 1.8

For example, refer to the LYM R1 alert in the CELL-DYN 1800 Region Alert Algorithms table above. Note that the algorithm is as follows: Group [2] / LYM ≥ 0.35. This means that the LYM R1 Alert will be set if the number of cells in Group 2 (channels 20 through 30) divided by the number of cells in the LYM groups 2, 3 and 4 (channels 20 through 55) is equal to or greater than 0.35.

Each of the remaining region alerts for both the CELL-DYN 1700 and CELL-DYN 1800 are determined in a similar manner.

Note: *Detailed information regarding Suspect Parameters or Suspect Populations may be found in the CELL-DYN 1800 System Operator's Manual.*

Section 4: Hardware

- Learning Objectives
- CELL-DYN 1700 and CELL-DYN 1800 Comparison Chart – Hardware
- Overview of Hardware Changes
- User Interface Computer (UIC)
- CPU Hardware/Software Configuration
- Cell Count Module (CCM)
- Signal Processor Module (SPM)
- Card Cage Backplane
- Pre-Amplifier Module (PAM)
- Power Supply Module
- Fans

Learning Objectives

Learning Objectives

Section 4 will explain the hardware changes made to the CELL-DYN 1800. After reviewing Section 4 of this workbook you should be able to do the following:

- Describe the User Interface Computer along with the Single Board Computer (SBC).
- Describe the changes made to the Signal Processor Module (SPM) PCB.
- List the adjustments on the SPM PCB and the order they should be adjusted in.
- Describe the changes made to the Cell Count Module (CCM) PCB.
- Describe the changes made to the Power Supply Assembly.
- List all voltages generated by the Power Supply Assembly and their function.
- List all fans that are used in the CELL-DYN 1800 and their function.
- Describe how the power supply and instrument cooling fans operate when the ambient temperature increases and decreases.
- List the connections on the SBC PCB.
- Describe the function of the Backplane PCB.
- List the PCBs that connect to the Backplane PCB.
- Describe the changes made to the PAM PCB.
- Describe the changes made to the Metering PCB.
- Describe the purpose of the LCD Interconnect PCB.
- Describe the purpose of the Backlight Inverter PCB.

CELL-DYN 1700 and CELL-DYN 1800 Comparison Chart – Hardware

Name	CELL-DYN 1700/1700CS	CELL-DYN 1800
Hardware		
Computer Hardware	386 or 486 Microprocessor (depends on when the instrument was built)	Celeron 850Mhz Microprocessor (All I/O, video, floppy/hard drive control circuitry is contained on a single board, connected to the cardcage)
	3½" Floppy Drive (front panel below CRT)	Same (right side on bezel)
Monitor/Display	14" Color SVGA Monitor	Color LCD Display Screen (10.4 inch)
Monitor Controls	Brightness/Contrast Knobs	One (1) brightness control knob located on left side of bezel
	7 dial version: 2 dials on right	N/A
	5 dial version: 2 dials on left	N/A
Power Switch Location	Right Panel	Same
Serial Number Location	Right Panel	Same
Lyse Delivery	Lyse Syringe	Same
Closed Sampler Solenoids	2	N/A
Fans	4	4 (two (2) instrument thermistor controlled cooling fans, one (1) thermistor controlled fan on +28v switching power supply and one (1) CPU fan)
DLA PCB	Yes	Same
CCM PCB	Yes	Different PCB (combined CCM and DCM circuitry)
DCM PCB	Yes	No (combined onto CCM)
SPM PCB	Yes	Different PCB (combined SPM and MAM circuitry)
MAM PCB	Yes	No (combined onto SPM)
PAM PCB	Yes	Different PCB (new PCB includes a high frequency reduction filter)
PC Power Supply	Yes (+5v, +12v and –12v)	No (+5v/+12v digital/–12v digital generated on DC Regulator PCB)

Name	CELL-DYN 1700/1700CS	CELL-DYN 1800
Hardware - Continued		
+24v Power Supply	Yes	No (replaced by +28v switching power supply)
Linear Power Supply	Yes (+15v, -15v, +12v unreg, +24v unreg and +100v)	No, Power Supply Assembly is made up of three (3) components: +28v switching power supply (+28v), DC Regulator PCB (+5v/+12v digital/-12v digital/+14v) and AC Regulator PCB (+12v analog/-12v analog/ +100v)
Pre-Amp Filter	No	Yes (used to filter the +/-12v analog between the AC Regulator PCB and PAM PCB)
Input Voltage Select Switches	Yes (found at rear of instrument on Linear Power Supply)	No (AC Regulator PCB senses input voltage and adjusts automatically)

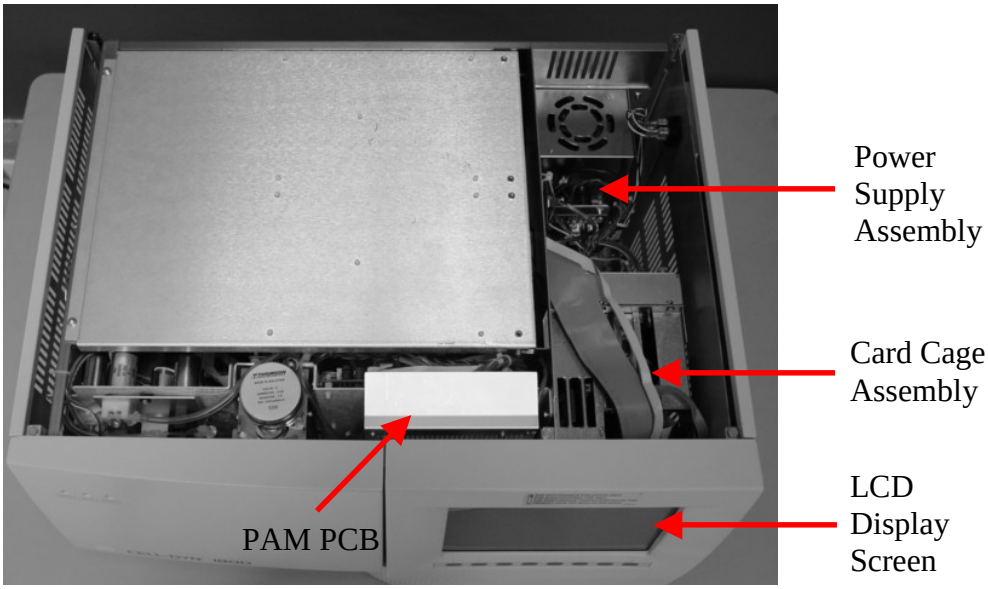
Overview of Hardware Changes

Repackaging
The changes made to the Power Supply Assembly in the CELL-DYN 1800 necessitated the relocation of the Card Cage Assembly to the front of the instrument, behind the Bezel. The CRT Display Monitor was replaced by a smaller and more compact LCD Display Screen to allow for the relocation of the Card Cage Assembly. In addition, the CPU Assembly was removed and replaced by a Single Board Computer PCB, which connects into the Card Cage Assembly.

Overview of Changes
The main changes that have been made to the right side of the instrument are as follows:

- The 486 CPU Assembly with power supply has been replaced by a Single Board Computer (SBC) design which includes LCD driver circuitry.
- The Data Link Adapter (DLA) and CPU Assembly known as “SBC” or Single Board Computer connect directly into the Card Cage Backplane PCB.
- The 14” CRT Monitor was eliminated and replaced by a 10.4 inch LCD Display Screen.
- The Main Amplifier Module (MAM) circuitry was incorporated into the Signal Processor Module (SPM) PCB, creating a single PCB for gain, pulse editing and threshold responsibilities.
- The Device Control Module (DCM) circuitry was incorporated into the Cell Count Module (CCM) PCB, creating a single PCB for Analog to Digital conversion and instrument control functions.
- The PC Power Supply, +24v Power Supply and Linear Power Supply has been replaced with a single power supply assembly that controls and supplies all AC and DC voltages to the instrument.
- The voltage and frequency selection switches on the Linear Power Supply were eliminated and replaced with an AC “Sense” Regulator PCB that automatically adjusts for different voltages and frequencies.
- The Pre-Amp Filter PCB was placed between the AC Regulator PCB and the Pre-Amplifier Module (PAM) to eliminate noise that may be generated on the +/-12vdc (analog) line.
- A High Frequency Reduction Filter circuit was added to the Pre-Amplifier Module (PAM) to eliminate high frequency noise that may interfere with Platelets.

Overhead View of Instrument



Printed Circuit Boards

The table below is a quick reference guide, which lists PCB compatibility between the CELL-DYN 1700 and CELL-DYN 1800.

Component	CELL-DYN 1700	CELL-DYN 1800	Note
Backlight Inverter PCB	N/A	X	New - Used for LCD Display Screen **(8405627701)**
Cable Dist. Module (CDM)	X	X	Interchangeable
Cell Count Module (CCM)	X	X	Not Interchangeable - Revised PCB has DCM circuitry incorporated **(8960273001)**
Chopper Driver Module	X	X	Interchangeable
Data Link Adapter (DLA)	X	X	Interchangeable
Device Control Module (DCM)	X	N/A	Eliminated (see CCM)
Indicator (status) PCB	N/A	X	New – Located on Upper Front Cover **(8960280001)**
In-Line Reagent PCB	X	X	Interchangeable

Component	CELL-DYN 1700	CELL-DYN 1800	Note
Main Amp Module (MAM)	X	N/A	Eliminated (see SPM)
Metering Board PCB (WBC and RBC)	X	X	Not Interchangeable - Different catalog number due to shorter metering tubes **(RBC – 8921027701 WBC – 8921027801)**
Card Cage Backplane PCB (referred to as Motherboard Module on CELL-DYN 1700)	X	X	Not Interchangeable -New PCB accommodates SPM, CCM, DLA and SBC **(8960274001)**
Motor Processor Module (MPM)	X	X	Interchangeable
Power Dist. Module (PDM)	X	N/A	Eliminated
Power Supply Assembly	X	X	Not Interchangeable - Completely redesigned **(8921029201)**
Pre-Amp Filter PCB	N/A	X	New PCB - Used to filter +/-12vdc (analog) to PAM **(8960281001)**
Pre-Amp Module (PAM)	X	X	Not Interchangeable - Revised PCB has new high frequency filter circuit **(8960275001)**
Pressure Regulator	X	X	Interchangeable
Pump Relay Module (PRM)	X	X	Interchangeable
Signal Processor Module (SPM)	X	X	Not Interchangeable - Revised PCB has MAM circuitry incorporated **(8960272001)**
Single Board Computer (SBC)	N/A	X	New PCB – Uses Celeron 850 MHz Processor **(8921029501)**
Solenoid Drive Module (SDM)	X	X	Interchangeable
Touch Pad Interconnect PCB	N/A	X	New PCB - Used for membrane keypad **(8960279001)**
Waste Overflow PCB	X	X	Interchangeable

User Interface Computer (UIC)

Discussion

The User Interface Computer (UIC) is designed around an Intel-compatible Celeron 850 MHz Microprocessor and is consolidated into a Single Board Computer design. The SBC receives +5v, +12v (digital) and –12v (digital) from the DC Regulator located on the Power Supply Assembly. Power is supplied through the Card Cage Backplane PCB. It receives status and measurement data from the CCM PCB via the DLA PCB.

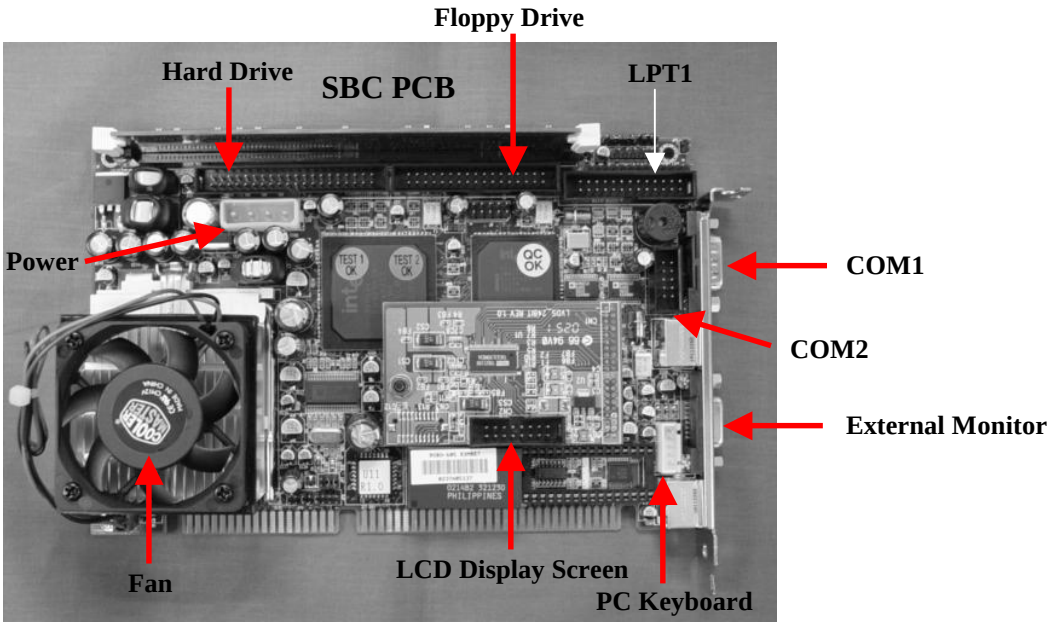
The User Interface Computer consists of the following modules:

- Single Board Computer (SBC)
- Hard Disk Drive
- Floppy Disk Drive
- Data Link Adapter
- LCD Display Screen

Single Board Computer (SBC)

The Single Board Computer (SBC) is an Intel-compatible Celeron 850 MHz Microprocessor. It connects directly into the Card Cage Backplane PCB, where a voltage source of +5v, +12v (digital) and –12v (digital) is supplied for the internal circuits.

Note: Processor speed will vary according to market availability



Several I/O functions commonly found as individual PCBs on other platforms were consolidated into the SBC. They are:

- Hard Disk Drive IDE Controller
- Floppy Disk Drive Controller
- Input/Output Controller
- Video

In-line connectors exist for the 101-key keyboard, printer port (LPT1), LIS (RS-232) port (COM1).

Note: *The external monitor connector located on the SBC PCB (refer to figure on previous page) can be used to connect an SVGA CRT monitor in case of LCD Display Screen failure during troubleshooting.*

Hard Disk Drive

The hard disk drive is the same between the CELL-DYN 1700 and CELL-DYN 1800 instruments.

Note: *Drive size will depend on availability.*

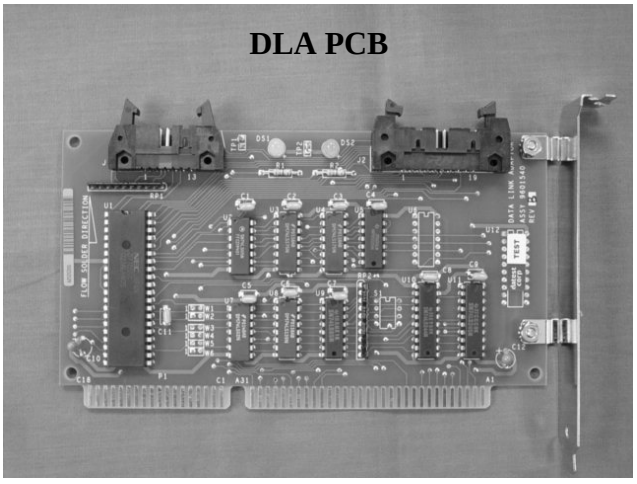
Floppy Disk Drive

The 1.44MB 3.5” floppy disk drive is the same between the CELL-DYN 1700 and CELL-DYN 1800 instruments.

Data Link Adapter (DLA)

The Data Link Adapter serves much the same purpose in the CELL-DYN 1800 as it did in the CELL-DYN 1700. It provides interfaces from the Single Board Computer (SBC) to both the Cell Count Module (CCM) and the instrument’s membrane keyboard. These two interfaces function independently under application software. However, some of the circuits on the DLA PCB are shared.

DLA PCB



LCD Display Screen

A 10.4 inch color Liquid Crystal Display (LCD) screen replaces the 14 inch Cathode Ray Tube (CRT) used on the CELL-DYN 1700. The LCD display screen is driven via a video adapter mounted directly on the SBC. The

video adapter supports SVGA 640 x 480 and 800 x 600 graphics modes. A Low Voltage Differential Signaling (LVDS) cable connects between the LCD display screen and the LCD Interconnect PCB to transmit imaging signals to the screen.

The LCD Display Screen uses a Backlight Inverter PCB to illuminate the panel and project the image on the screen. The SBC provides +12vdc (digital) to the LCD Interconnect PCB, which is then stepped up by the Backlight Inverter PCB. The backlight is controlled through the software and employs a screen saver that turns the screen on/off.

Note: *Measuring voltages directly with a digital multi-meter on the Backlight Inverter PCB may damage the board.*

LCD Display

CPU Hardware/Software Configuration

CMOS Setup

The CMOS Setup contains all the information needed by the BIOS system to establish proper communications between the Single Board Computer (SBC) and various computer hardware devices.

Note: *Refer to the CELL-DYN 1800 System Service Manual, Section 5 VP-05 CMOS Setup Verification/Adjustment for instructions on accessing and modifying CMOS settings.*

Troubleshooting

In a case where the LCD Display Screen goes blank, an SVGA (CRT) monitor can be connected to the external monitor connector (15-pin) on the SBC PCB. Refer to the figure in the Single Board Computer (SBC) description earlier in this section to locate the external monitor connector. Once the instrument's image can be viewed, refer to the CELL-DYN 1800 System Service Manual, Section 5, VP-05 CMOS Setup Verification/Adjustment. Verify the **LCD CRT Selection**, as well as the **LCD Type** settings in the Advanced ChipSet Setup screen. It is possible that the settings may have been reset to default. Follow the instructions in the verification procedure to establish the correct settings and save them to memory. If the symptom returns after the power is turned off/on, then the SBC PCB will need to be replaced.

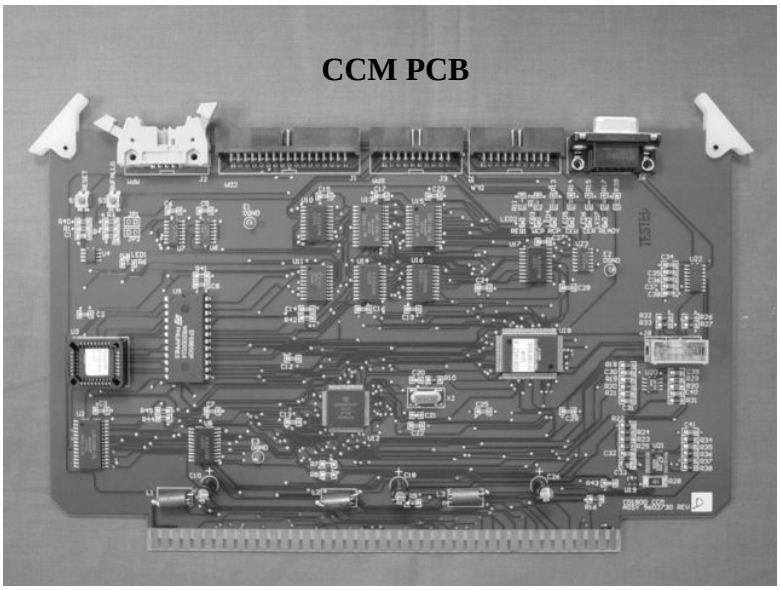
Cell Count Module (CCM)

The Cell Count Module (CCM) is a dedicated single board computer based on the Motorola MC68HC11KW1 processor. In the CELL-DYN 1800, the CCM inherited the DCM circuitry, formally on the CELL-DYN 1700. The CCM functions include the following:

- Flow system control and functions (i.e., reagent handling, waste handling, sample handling, volume metering, etc.)
- Measurement (WBC/RBC/PLT and HGB) and analog control
- Receiving process commands from the SBC and executing related Flow-script(s)
- Extracting MPM-related commands from Flow-scripts and passing those commands to the MPM.
- The data from the SPM will directly address the CCM Histogram Memory. Four histograms will be built: WBC, RBC for MCV, RBC Count and PLT.

Note: The CCM does not have any adjustments.

CCM PCB



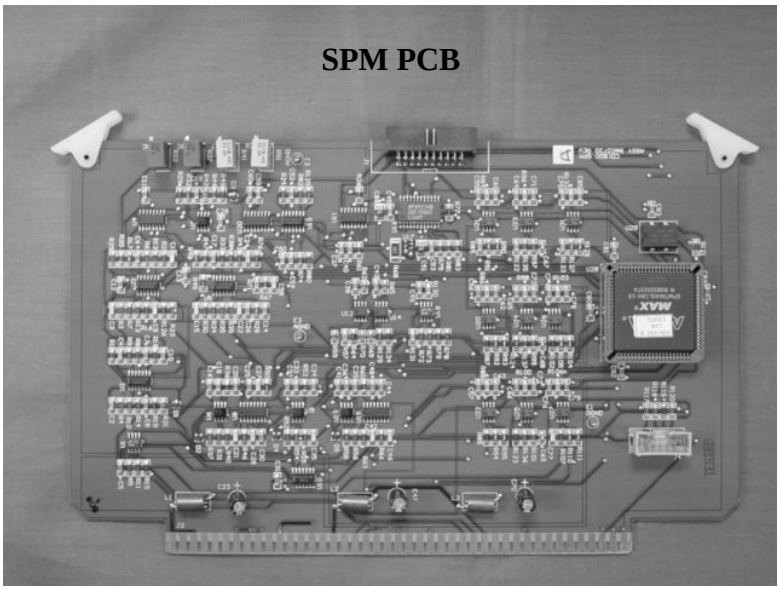
Signal Processor Module (SPM)

The SPM receives cell pulse input signals from the Pre Amplifier Module (PAM) and handles the dynamic cell-by-cell analysis. The cells are analyzed for size by the SPM. The size information is handed off to the CCM that enumerates the data. In the CELL-DYN 1800, the SPM inherited the MAM circuitry, formally on the CELL-DYN 1700 instrument. The SPM functions on the CELL-DYN 1800 include the following:

- Receives two (2) signals from the PAM (Preamp Module), WBC (white blood cell) and RBC/PLT (red blood cell/platelet). Two distinct signal paths handle the two signals.
- Processes WBC data by converting validated signal heights to a digital value. Signals too small or too large are excluded according to the thresholds set within the SPM.
- Splits the RBC signal received from the PAM into two (2) data acquisition paths. The two paths include the Platelet (PLT) data and RBC data paths. Due to the size differentiation between the two signals, internal thresholds separate the RBC's from the PLT's.
- Institutes the cell editing circuitry on the RBC data acquisition path. During this function, the area of the pulse is compared to the pulse height. Pulses which have too much area compared to the pulse height are excluded.

Note: *The CELL-DYN 1800 SPM PCB does not require channel offset and threshold adjustments. However, the RBC gain, RBC Editing Ratio, WBC and PLT gains can and need to be adjusted in that order. Refer to the CELL-DYN 1800 System Service Manual, Section 5, VP-09 Signal Processor Module (SPM) Verification/Adjustment*

SPM PCB

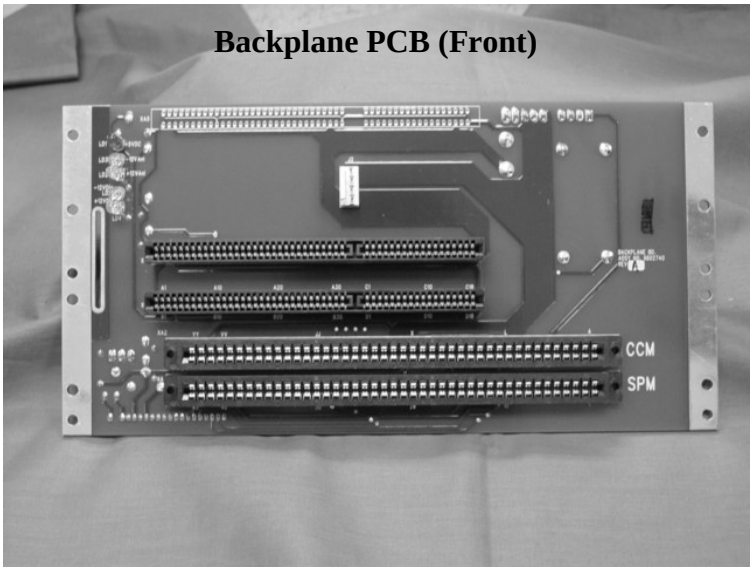


Card Cage Backplane

The Card Cage Backplane PCB (referred to as the Motherboard Module on the CELL-DYN 1700) has been totally redesigned to accommodate the SPM, CCM, DLA and SBC PCBs. The board, mounted at the rear of the card cage, receives supply voltages from the AC and DC Regulator PCBs to power the various PCBs via the Backplane's internal bus. The data communication between the PCBs in the card cage is performed through the different flat ribbon cables. The Backplane PCB also receives measurement data from the PAM PCB.

A set of five (5) LEDs are mounted on the front side of the board to indicate +5vdc, +/-12vdc (analog) and +/-12vdc (digital) are being supplied to the Backplane PCB.

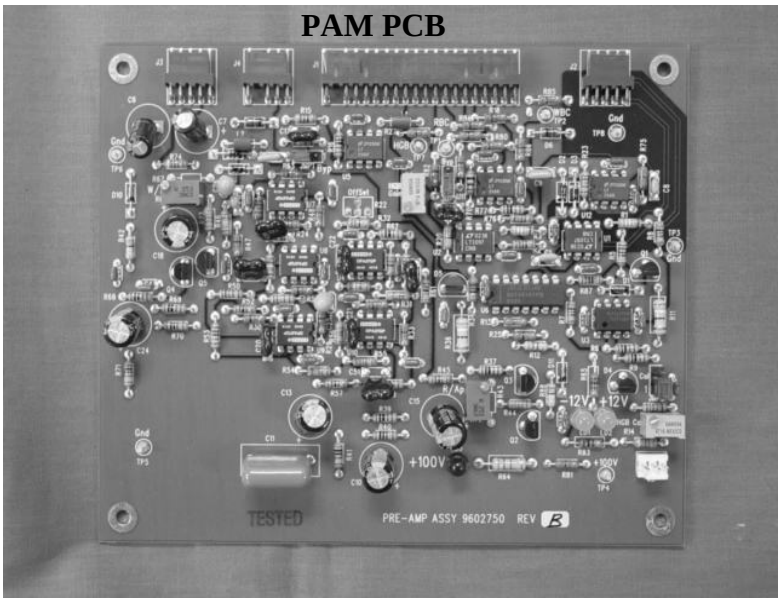
Backplane PCB (Front)



Pre-Amplifier Module (PAM)

The Pre-Amplifier Module (PAM) functions similarly between the CELL-DYN 1700 and CELL-DYN 1800 instruments. However, the only change made was the addition of a high frequency filter circuit to the PAM. This filter circuit will help eliminate high frequency noise that can interfere with PLT signal data.

PAM PCB

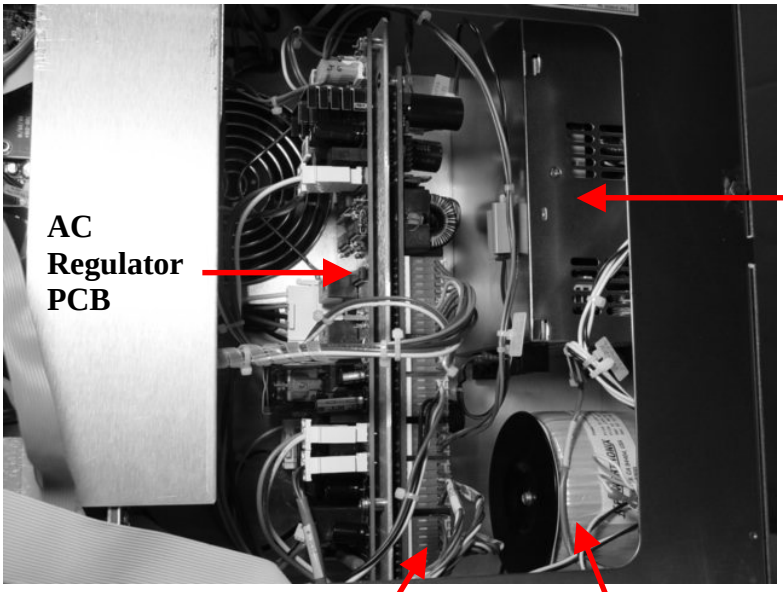


Power Supply Module

The Power Supply Assembly is comprised of four components: AC Regulator PCB, DC Regulator PCB, +28VDC Switching Power Supply and Power Transformer. These components are mounted together as an assembly and are located at the right/rear side of the instrument.

When the system is turned on, the AC line voltage is supplied to the AC Regulator PCB and +28VDC Switching Power Supply. The AC Regulator PCB automatically accommodates line voltages of 90 – 130VAC and 200 – 260VAC by sensing the input voltage and utilizing an internal comparator bank and power transformer to produce the 120VAC necessary for the subsystem's function. The Power Supply Assembly then provides an AC and DC voltage source to various components on the CELL-DYN 1800 System.

The Power Supply Assembly used on the CELL-DYN 1700 is not compatible with the CELL-DYN 1800. The +24v and PC Power supplies have been eliminated and those supplied voltages moved to the CELL-DYN 1800 instrument's Power Supply Assembly.



+28 volt Switching Power Supply

- Supplies +28 volts to the DC Regulator PCB.

AC Regulator PCB

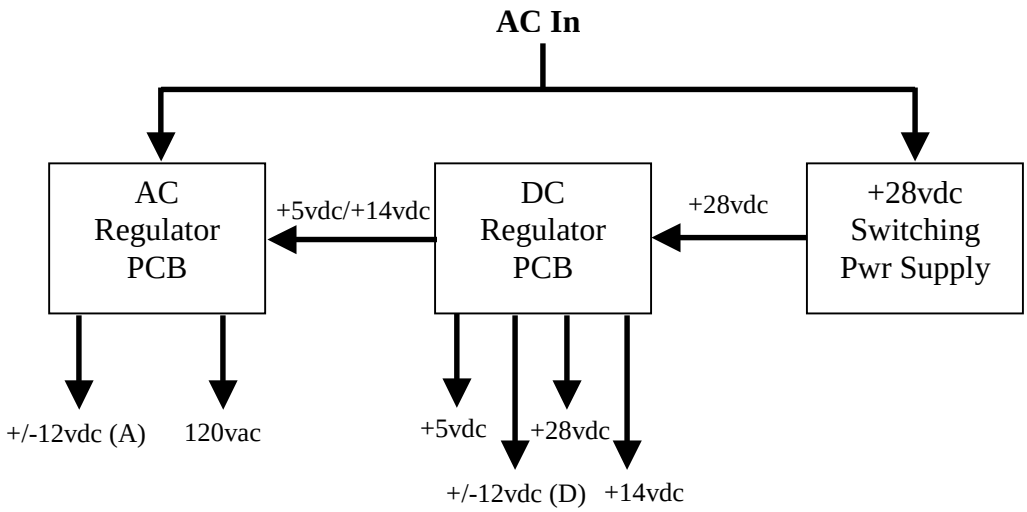
- Supplies +/-12vdc (Analog) to the Backplane PCB for use on SPM and CCM PCBs. These voltages replace the +/-15vdc found on the CELL-DYN 1700.
- Supplies +/-12vdc (Analog) to the Pre-Amplifier Module (PAM) via the Pre-Amp Filter Assembly, Cable Distribution Module and Motor Processor Module PCBs.
- Supplies +100 volts to the Pre-Amplifier Module (PAM) for the constant current supply circuit to the transducers.
- Supplies 120vac to Pump Relay Module (PRM).
- Supplies input voltage (wall voltage) to the power transformer. In return, the power transformer supplies +/-16vac and 120vac, regardless of the input voltage.

DC Regulator PCB

- Supplies +5vdc to the Card Cage Backplane PCB for use on SPM, CCM, DLA and SBC PCBs. This voltage is also used by the CDM, MPM, Hard and Floppy Disk Drives.
- Supplies +12vdc (digital) is provided to the Backplane PCB for use on the CPU fan. The Hard and Floppy Disk Drives receive +12vdc for their operation.
- Supplies +14vdc to Cable Distribution Module to be used by the Solenoid Driver Modules to maintain solenoids energized (hold voltage).

- Supplies +28vdc to Cable Distribution Module, Motor Processor Module and instrument cooling fans. The +28vdc is used by the Motor Processor Module to supply power to the DC motors via the Chopper Driver Modules. Also, +28vdc is supplied to the Cable Distribution Module and used by the Solenoid Driver Module to initially energize solenoids.
- Supplies +5vdc and +14vdc to the AC Regulator PCB.

Power Supply Assembly Diagram



Fans

Overview

There are four (4) fans located in the CELL-DYN 1800 System; two (2) fans are used for instrument cooling, one (1) fan is used to cool the microprocessor on the SBC PCB and one (1) fan is used to cool the +28vdc Switching Power Supply.

Instrument Cooling Fans

The left side exhaust fan (blows out) located above the Sample Syringe Assembly functions similarly to the CELL-DYN 1700 instrument. In addition, an intake fan was placed on the sidewall between the Fluid Power Supply compartment and the right side compartment, behind the Card Cage Assembly. The orientation of the two (2) fans allows air to enter through the right side panel, drawing air through the Fluid Power Supply and backside of the flow panel and then exits out through the left side panel. Refer to figure on next page.

The two (2) rear panel fans found on the CELL-DYN 1700 were removed on the CELL-DYN 1800.

Note: *The two instrument cooling fans are thermistor controlled, which means that when the ambient temperature inside the instrument drops below 25°C, the fans will operate at half speed. Once the temperature rises above 25°C, the speed is increased linearly until it reaches 35°C, when the fans operate at full speed.*

+28vdc Switching Power Supply Fan

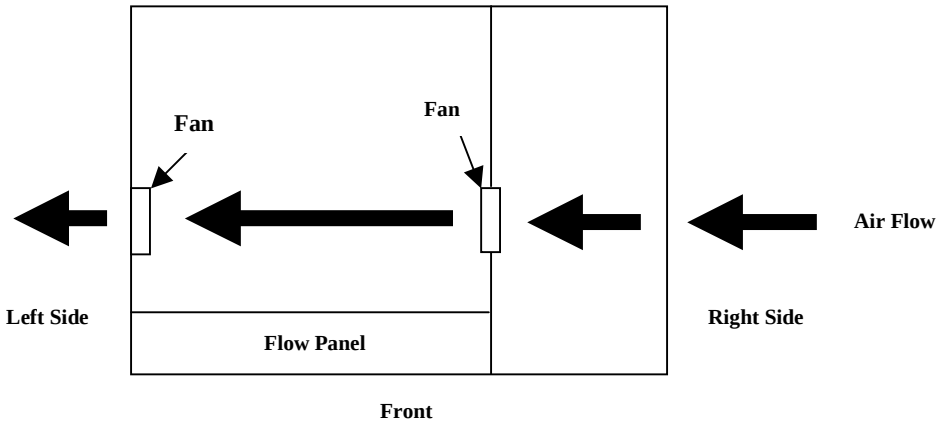
The fan is mounted inside the power supply's casing and can be viewed from the top of the unit.

Note: *The power supply's cooling fan is thermistor controlled, which means that when the internal temperature rises above 70°C, the fan operates at full speed. The fan is then turned off at 50°C and kept off until the temperature rises above 70°C.*

CPU Fan

The CPU fan is used to cool the Celeron 850 MHz microprocessor and is mounted directly on the SBC PCB. The +12vdc (digital) used to power the fan is supplied from the DC Regulator PCB through the Backplane PCB.

CELL-DYN 1800 System Air Flow



Section 5: Appendix

- CELL-DYN 1800 Field Service Training Final Test
- Parts & Accessories
- CELL-DYN 1700 and CELL-DYN 1800 Comparison Chart

CELL-DYN 1800 Field Service Training Final Test

1. What PCB was added to the Upper Front Cover?
   A. Backlight Inverter PCB
   B. LCD Interconnect PCB
   C. Status Indicator PCB
   D. None of the above

2. The Upper Front Cover opens to the left. True or False?

3. Which cover is the Lower Front Cover secured to?
   A. Upper Front Cover
   B. Bezel
   C. Right Side Cover
   D. All of the above

4. In order to remove the Bezel, which screw on the Right Side Cover must be removed?
   A. Rear screw
   B. Front screw
   C. Both rear and front screws
   D. Not attached to Right Side Cover

5. An LCD type of screen is used on the CELL-DYN 1800. True or False?

6. The floppy disk drive is located on the right side of the Bezel. True or False?

7. Which printer format(s) are available on the CELL-DYN 1800?
   A. ESC/P
   B. PCL
   C. None of the above
   D. Both ESC/P and PCL

8. Where do you change the printer formats?
   A. SETUP menu
   B. RUN menu
   C. DIAGNOSTICS menu
   D. None of the above

9. The Specimen ID field on the CELL-DYN 1800 supports up to 16 alphanumeric characters. True or False?

10. How many run cycles can be stored in the CELL-DYN 1800 Datalog?
    A. 2,500
    B. 5,000
    C. 7,500
    D. 10,000

11. A CN-Free Diff Lyse is used on the CELL-DYN 1800? True or False?

12. WBC Differential Channel/Size ranges and Region Alerts were modified on the CELL-DYN 1800. True or False?

13. How many fans on the CELL-DYN 1800?
    A. 3
    B. 4
    C. 2
    D. 1

14. The +28vdc Switching Power Supply fan is turned off when the internal temperature is between 50°C and 70°C. True or False?

15. The two (2) instrument fans operate at half speed when the internal temperature is below 25°C. True or False?

16. What voltage is used for the two (2) instrument cooling fans?
    A. +28vdc
    B. +14vdc
    C. +12vdc (digital)
    D. +12vdc (analog)

17. There are two (2) fan filters located at the rear of the CELL-DYN 1800? True or False?

18. The SBC PCB on the CELL-DYN 1800 replaced the CPU Assembly on the CELL-DYN 1700. True or False?

19. What connects to the SBC PCB?
    A. PS/2 (101-key) Keyboard
    B. Input/Output Ports
    C. LCD Display Screen
    D. Hard and Floppy Disk Drives
    E. All of the above

20. If the LCD Display goes blank, an SVGA monitor can be connected to the top of the SBC PCB to allow for CMOS Setup verification in order to troubleshoot the problem. True or False?

21. The DCM PCB on the CELL-DYN 1700 was incorporated into which PCB on the CELL-DYN 1800?
    A. SPM
    B. MAM
    C. CCM
    D. DLA

22. The MAM PCB on the CELL-DYN 1700 was incorporated into which PCB on the CELL-DYN 1800?
    A. SPM
    B. MAM
    C. CCM
    D. DLA

23. The following adjustments are made on the CELL-DYN 1800 SPM PCB: RBC gain, RBC Editing Ratio, WBC gain and PLT gain. True or False?

24. Match the order in which the adjustments are made on the SPM PCB?

1. ____	A. RBC Editing Ratio
2. ____	B. PLT gain
3. ____	C. WBC gain
4. ____	D. RBC gain

25. What is the purpose of the SPM PCB on the CELL-DYN 1800?
    A. Receives WBC and RBC/PLT signal from PAM PCB
    B. Fixed amplification (gain) of signals
    C. Applies thresholds to signals
    D. Contains cell editing circuitry for RBC
    E. All of the above

26. What is the purpose of the CCM PCB on the CELL-DYN 1800?
    A. Flow System Control and functions
    B. Measurement and analog control
    C. Interfacing with SBC PCB
    D. Receives data from SPM PCB for CCM Histogram Memory
    E. All of the above

27. What are the two (2) PCBs on the power supply assembly?
    A. DC Regulator PCB
    B. AC Regulator PCB
    C. Both A and B
    D. None of the above

28. The LEDs on the Cardcage Backplane PCB indicate system status. True or False?

29. Which PCB(s) connect into the Cardcage Backplane PCB?
    A. MPM, CDM, SBC and DLA
    B. SPM, CCM, DLA and SBC
    C. MAM, SPM, DCM and CCM
    D. MPM, MAM, CDM and CCM

30. The AC Regulator PCB automatically senses the input voltage and produces the 120vac necessary for the system's function. True or False?

31. Which voltages does the AC Regulator PCB supply?
    A. +/-12vdc (analog) and 120vac
    B. +/-12vdc (analog), +/-12vdc (digital) and 120vac
    C. +5vdc, +/-12vdc (digital), +28vdc and +14vdc
    D. None of the above

32. Which voltages does the DC Regulator PCB supply?
    A. +/-12vdc (analog) and 120vac
    B. +/-12vdc (analog), +/-12vdc (digital) and 120vac
    C. +5vdc, +/-12vdc (digital), +28vdc and +14vdc
    D. None of the above

33. What is the voltage supplied by the +28 volt switching power supply used for?
    A. Instrument cooling fans
    B. DC motors
    C. Solenoids
    D. All of the above

34. The Pre-Amp Filter PCB is located between the AC Regulator PCB and the PAM PCB. True or False?

35. The same PAM PCB is used for both the CELL-DYN 1700 and CELL-DYN 1800. True or False?

36. The only physical difference between the CELL-DYN 1700 and CELL-DYN 1800 Metering PCBs are the metering tubes. True or False?

37. Which PCB illuminates the LCD Display Screen?
    A. Status Indicator PCB
    B. LCD Interconnect PCB
    C. Backlight Inverter PCB
    D. None of the above

38. What happens when the Backlight Inverter PCB is defective?
    A. Vertical lines
    B. Horizontal lines
    C. Diagonal lines
    D. Blank screen

Answer Sheet

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
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37. _____
38. _____

Parts and Accessories

CELL-DYN 1800 Equipment, Parts and Accessories

Abbott List Number	Description of Part	Configuration
03H54-01	Accessory Kit (NOTE: For a list of items in the Kit, see the Accessory Kit Table)	1
07H80-01	Operator's Manual	1
07H79-01	Interface Specifications	1
20821-01	Printer (120V)	1
20822-01	Printer (220V)	1
03H56-01	Keyboard	1
92274-01	Aperture Plate WBC	100 µm
92264-01	Aperture Plate RBC	60 µm
28561-01	Lyse Syringe	2.5 mL
04H36-01	Diluent Syringe	10 mL
28514-01	Sample Syringe	100 µL
21704-01	Waste Dummy Plug	1
93164-01	Sample Probe	1
54305-01	Aperture Brush	1
03H92-01	Detergent Line Inlet Assy	1
20005-01	Printer Cable	1
91012-01	Teal Line Filter Isolation	1
07H81-01	Bar Code Scanner	1
03H96-01	Pull Ring, Solenoid	1
99650-01	Code 39 Bar Code Labels	1000 pkg.
07H67-01	Lyse Cap for 960 mL container	5
07H67-02	Lyse Cap for 3.8 L or 20 L container	5

Parts and Accessories

CELL-DYN 1800 Accessory Kit ** (L/N 03H54-01)

Abbott List Number		Description of Part	Configuration
1403204		Keyboard Cover	1
5100161	*	Fuse, SB 2.5 amps 250 V	2
60160-01	*	Fuse, SB 5.0 amps 220/240 V	2
93501-01		Power Cord	1
5406753		Allen Wrench 3/32”	1
5406754		Allen Wrench 7/64”	1
54305-01		Aperture Brush	1
91072-01		Reagent Line Kit	1
20005-01		Printer Cable	1
9150143		Instructions for Mixing and Handling	1
93476-01		Silicon Tubing (S2)	1 (24”)

* For CELL-DYN 1700 System use only.

CELL-DYN Reagent Line Kit (L/N 91072-01)

Abbott List Number	Description of Part	Configuration
03H82-01	Reagent Line Assembly, Lyse (1L)	1
92161-02	Waste Line Assembly	1
92163-01	Diluent Line Inlet Assembly	1
92178-01	Lyse Line Inlet Tube	1

CELL-DYN Reagents

Abbott List Number	Description of Part	Configuration
07H84-01	CN-Free Diff Lyse (3.8L)	3.8 liter cube
07H84-02	CN-Free Diff Lyse (960mL)	1 x 960 mL Bottle
99320-01	Detergent	20 liter cube
99326-01	Detergent	4 x 3.8 liter bottles
98329-01	Detergent	1 x 3.8 liter bottle
99220-01	Diluent	20 liter cube
99226-01	Diluent	4 x 3.8 liter bottles
99229-01	Diluent	1 x 3.8 liter bottle

** Same as CELL-DYN 1700 Accessory Kit

Parts and Accessories

CELL-DYN Controls and Calibrators

Abbott List Number	Description of Part	Configuration
99109-01	CELL-DYN 16 Tri-Level Control	12 x 2.5 mL; 4 of each level
99105-01	CELL-DYN 16 Tri-Level Control (Half Pack)	6 x 2.5 mL; 2 of each level
02H40-01	CELL-DYN 16 Normal Control	6 x 2.5 mL
99110-01	CELL-DYN Calibrator	2 x 2.5 mL
01H92-01	CELL-DYN 16 Control Assay Disk	1
93111-01	CELL-DYN 22 Tri-Level Control	12 x 2.5 mL; 4 of each level
99106-01	CELL-DYN 22 Tri-Level Control (Half Pack)	6 x 2.5 mL; 2 of each level
99103-01	CELL-DYN 22 Normal Control	6 x 2.5 mL of normal control
99120-01	CELL-DYN 22 Calibrator	2 x 2.5 mL
01H91-01	CELL-DYN 22 Control Assay Disk	1

CELL-DYN Consumables

Abbott List Number	Description of Part	Configuration
99644-01	Enzymatic Cleaner Concentrate	2 x 50 mL
30005-01	Okidata® Graphics Paper	3000 sheets/pkg.
13401-01	Ribbon Okidata® 320	1
03H10-03	HP Inkjet Printer	1
30010-06	Printer Paper (8½” x 11”)	
93601-14	Printer Stand (Okidata® 320)	1
03H10-04	HP Printer Cartridge (Black)	1
30010-08	HP Printer Paper	
99605-01	CELL-DYN Counting Cups	500/pkg.

CELL-DYN 1700 and CELL-DYN 1800 Comparison Chart

Name	CELL-DYN 1700/1700CS	CELL-DYN 1800
Covers		
Upper Front	Yes	Different, hinged cover that opens to the left and contains Status Indicator PCB.
Lower Front	Yes	Different, secured to bezel.
Bezel	Yes	Different, contains LCD display screen, Touch Pad (membrane) keyboard and floppy disk drive.
Top	Yes	Different, dimensions
Left	Yes	Different, dimensions
Right	Yes	Different, contains cut out to connect PC/2 keyboard, LIS and printer.
System Performance		
Parameters	18 (PCT and PDW not reportable in US)	18 (PCT and PDW not reportable in US)
WBC Differential	3 Part Diff (Lym, Mid, Gran)	Same
Histograms	WBC, RBC, PLT (display & printout)	Same
Technology	WBC, RBC, PLT: Impedance	Same
	HGB: Modified Cyanmethemoglobin Method	Modified Methemoglobin Method (cyanide free)
Closed Tube Sampler	No/Yes	No
Sample Volume		
Open	30 µL	Same
Closed	450 µL	N/A
Pre-Dilute	40 µL	Same
Reagents		
	Lytic Agent (Diff Screen)	Cyanide-Free (CN-Free) Diff Lyse
	Diluent (Diff Screen)	Same
	Detergent (Diff Screen)	Same

Name	CELL-DYN 1700/1700CS	CELL-DYN 1800
Hardware		
Computer Hardware	386 or 486 Microprocessor (depends on when the instrument was built)	Celeron 850Mhz Microprocessor (All I/O, video, floppy/hard drive control circuitry is contained on a single board, connected to the cardcage)
	3½" Floppy Drive (front panel below CRT)	Same (right side on bezel)
Monitor/Display	14" Color SVGA Monitor	Color LCD Display Screen (10.4 inch)
Monitor Controls	Brightness/Contrast Knobs	One (1) brightness control knob located on left side of bezel
	7 dial version: 2 dials on right	N/A
	5 dial version: 2 dials on left	N/A
Power Switch Location	Right Panel	Same
Serial Number Location	Right Panel	Same
Lyse Delivery	Lyse Syringe	Same
Closed Sampler Solenoids	2	N/A
Fans	4	4 (two (2) instrument thermistor controlled cooling fans, one (1) thermistor controlled fan on +28v switching power supply and one (1) CPU fan)
DLA PCB	Yes	Same
CCM PCB	Yes	Different PCB (combined CCM and DCM circuitry)
DCM PCB	Yes	No (combined onto CCM)
SPM PCB	Yes	Different PCB (combined SPM and MAM circuitry)
MAM PCB	Yes	No (combined onto SPM)
PAM PCB	Yes	Different PCB (new PCB includes a high frequency reduction filter)
PC Power Supply	Yes (+5v, +12v and –12v)	No (+5v/+12v digital/–12v digital generated on DC Regulator PCB)
+24v Power Supply	Yes	No (replaced by +28v switching power supply)

Name	CELL-DYN 1700/1700CS	CELL-DYN 1800
Hardware – Cont.		
Linear Power Supply	Yes (+15v, -15v, +12v unreg, +24v unreg and +100v)	No, Power Supply Assembly is made up of three (3) components: +28v switching power supply (+28v), DC Regulator PCB (+5v/+12v digital/-12v digital/+14v) and AC Regulator PCB (+12v analog/-12v analog/ +100v)
Pre-Amp Filter	No	Yes (used to filter the +/-12v analog between the AC Regulator PCB and PAM PCB)
Input Voltage Select Switches	Yes (found at rear of instrument on Linear Power Supply)	No (AC Regulator PCB senses input voltage and adjusts automatically)
User Interface		
Quality Control Files	Twelve (12) QC Files (four (4) each for L, N, H controls)	Same
Replicate Files	Nine (9) Replicate Files (120 data points per file)	Same
QC Upload/Download	Yes	Yes
Data Log Storage	5,000 Run Cycles	10,000 Run Cycles
Data Log Storage Type	Numeric & Graphic data	Same
RS232 Interface	Yes	Yes
Computer Interface Configuration	Done in software: **SETUP** menu – **COMPUTER SETUP**	Same
Report Demographics	Specimen ID # - nine (9) numeric digits	Specimen ID # - 16 alphanumeric characters
	Patient Name	Same
	Male/Female	Same
	Date of Birth	Same
	Physician Name	Same
	Date/Time Collected	Same
	Comments	Same
Patient Limit Sets	4 - User Definable	Same
Reference Range Display (Limit Sets)	Yes	Same
Patient Limit Flag (L, H)	Yes - Screen/Printout	Same
Panic Limit Flags (LL, HH)	Yes	Same

Name	CELL-DYN 1700/1700CS	CELL-DYN 1800
User Interface – Cont.		
WBC Histogram Range	0 to 450 fL	Same
Customized Header	Yes - 4 Lines	Same
Optional Manual Differential Grid	Yes - For Alerted and Non-Alerted Specimens	Same
On-Screen Maintenance Procedures	Yes - Graphic Color Directions	Same
Accessories		
Handheld Barcode Reader	No	Yes (optional)
Printer	Okidata 320 dot matrix printer	Okidata 320 dot matrix printer and * HP Inkjet® Printer
Printer formats	ESC/P	ESC/P and PCL3 (selectable in **SETUP** menu)

* model depends on market availability